PROC. BIOL. SOC. WASH.
95(3), 1982, pp. 495–504

A NEW GENUS OF BOMOLOCHID COPEPODS FROM INDO-WEST PACIFIC NEMIPTERID FISHES

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Abstract.—A new genus, *Holocolax,* is described to include *H. nemipterus* (Pillai, 1973) and two new species, *H. longisetus,* and *H. russelli.* The new genus is characterized by an armature of 1 spine and 3 long setae on the last endopod segment of the female third leg as opposed to 2 spines and 2 setae in other bomolochid genera. The parasites are described from 3 species of *Nemipterus.*

In 1973 Pillai described a new species of bomolochid copepod from the inner surface of the operculum of *Nemipterus japonicus* (Bloch) from India. Following the revisions of bomolochid genera by Vervoort (1962, 1969) he assigned the new species to the genus *Holobomolochus* Vervoort on the basis of the first antenna being without modified setae. He noted, however, that the new species differed from all other species of *Holobomolochus* by the peculiar nature of the last endopod segment of the female third leg. In other species of *Holobomolochus* the last endopod segment bears 2 short, inner spines and 2 setae. Pillai's species has 1 short inner spine and 3 setae. Examination of a number of species of *Nemipterus* resulted in recovering 2 more species, closely related to *H. nemipteri* with the same peculiar armature of the female third leg.

Based on these additional 2 new species described below I consider the 3 species to represent a new genus.

Holocolax, new genus

Diagnosis.—Bomolochidae. Body form typical of family. Thoracic segments bearing legs 2–5 free. Abdomen of female 3-segmented; male 2-segmented. Caudal rami of female with 5 minor and 1 major setae; male with 4 minor and 2 major setae. Rostrum without hooks. First antenna 5-segmented. Second antenna with 3 terminal and 1 subterminal claw, all of about equal length. Mouthparts typical of family. Maxilliped of female without accessory process. Legs 1–4 biramose, all rami 3-segmented except male leg 4 endopod 2-segmented. First leg of female modified as typical of family, male unmodified. Middle endopod segment with 1 inner seta and last endopod segment of leg 3 with 1 short spine and 3 setae in leg 3 of female, male with 2 spines and 2 setae.

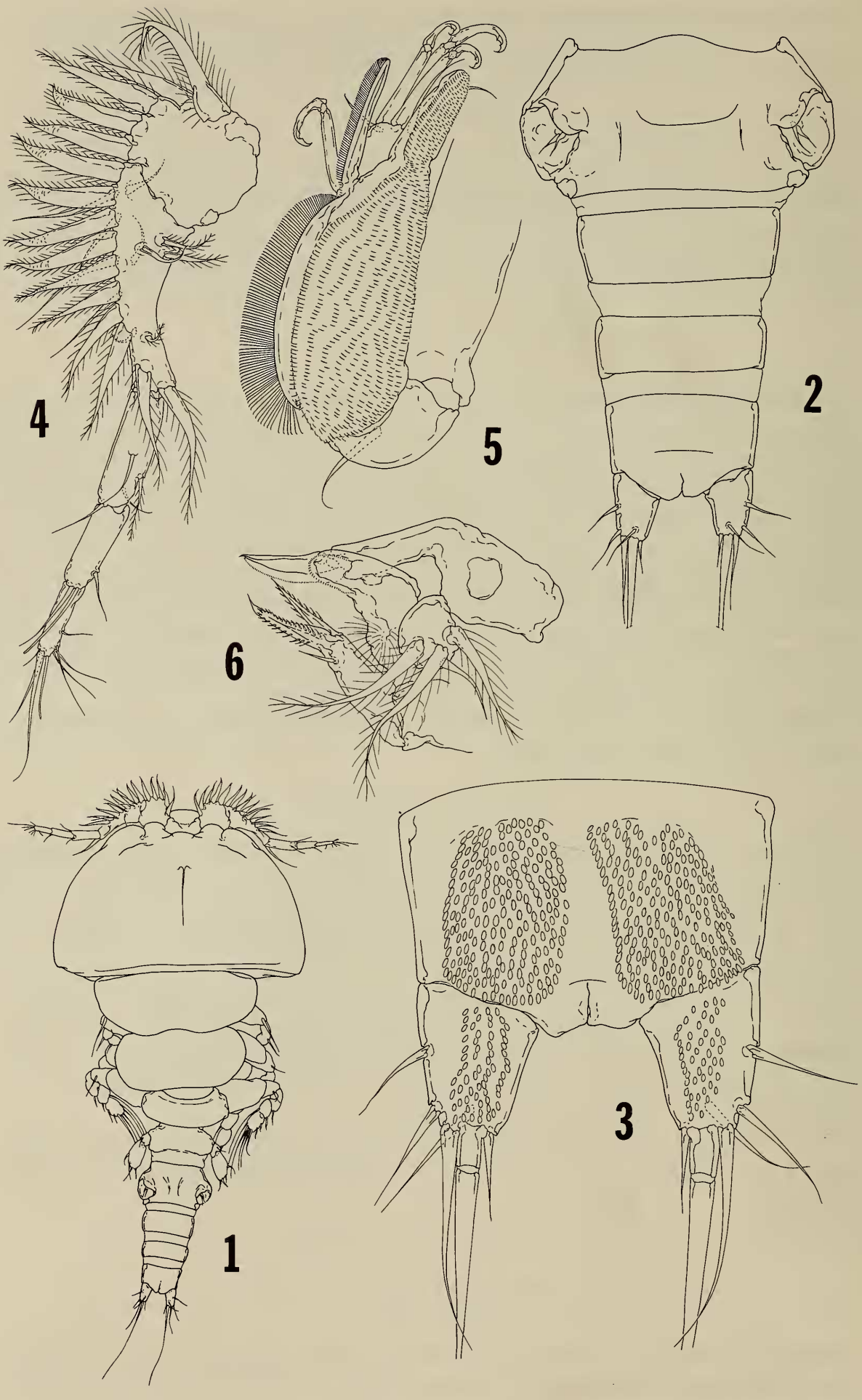
Etymology.—A combination of *Holobomolochus,* the genus to which Pillai's species was assigned, and *colax,* a common suffix in bomolochid genera. Gender masculine.

Type-species.—*Holocolax longisetus,* new species.

Holocolax longisetus, new species

Figs. 1–21

Material examined.—Holotype ♀ (USNM 190510), allotype ♂ (USNM 190511) and 22 paratypes ♀ (USNM 190512) from the gill area of 26 *Nemipterus mulloides*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(USNM 200270) collected by Kunz and Wells from Taiwan. Additional material consisting of 5 specimens from 7 specimens of the same host species (USNM 76624) from Taiwan.

Female.—Body form as in Fig. 1. Total lengths and greatest widths of 3 specimens 914 × 507 μm, 884 × 464 μm, and 812 × 449 μm (widths measured at widest part of cephalon, additional measurements based on largest specimen). Genital segment (Fig. 2) wider than long (144 × 86 μm). Abdomen 3-segmented, segments measure 58 × 85 μm, 58 × 86 μm, and 44 × 82 μm (l × w) respectively; last abdominal segment with 2 large ventral patches of spatulate spines (Fig. 3). Caudal rami (Fig. 3) longer than wide (36 × 20 μm), each with a ventral patch of spatulate spinules, an outer lateral seta, an outer subterminal seta (middle one much longer and wider at its base than other 2), and 1 dorsal subterminal seta (all setae naked).

First antenna (Fig. 4) with 5 segments, 15 plumose setae on outer edge of first 2 segments, no modified setae on first segment; an aesthete on each of last 2 segments. Rostral hooks absent. Second antenna (Fig. 5) second segment with numerous hooklike spinules arranged in irregular rows and a subterminal articulated spine about equal in length and width to the 3 articulated spines of last segment; 2 naked setae on last segment in addition to spines. Mouthparts (Fig. 6) typically bomolochid except first maxilla with the smaller, naked seta, more prominent than in other bomolochids. Maxilliped (Fig. 7) with a small naked seta on first segment, 3 long plumose setae on second segment, and a heavily sclerotized recurved claw, without an accessory process.

Legs 1–4 biramous. Leg 1 (Fig. 8) exopod with heavily sclerotized spine on outer distal corner of first segment, otherwise typically bomolochid; endopod first 2 segments each with a patch of spatulate spinules along outer distal margin. Inner seta of basipod modified as a bilobed spatulate process. Second leg (Fig. 9) basipod with prominent plumose seta at outer distal corner; exopod first segment with large patch of hairs on outer distal surface and a fringed spine at outer distal corner, second segment with outer fringed spine and an inner seta, last segment with 3 outer fringed spines and 6 setae, all setae on last segment with short plumosities along outer edge, all spines of exopod with terminal flagellum; endopod first segment with patch of spatulate spinules along outer margin and an inner seta, second segment similar to first except an additional seta, last segment with 2 outer plumose spines and 3 plumose setae. Leg 3 (Fig. 10) exopod first segment with large patch of spatulate spinules on outer distal surface and a spine at outer distal corner, second segment similar to first except with an inner seta, last segment with patch of spatulate spinules, 3 outer spines, and 5 inner setae, all exopod spines with fringe along outer margin and with a terminal flagellum, setae of last segment armed as those of leg 2; endopod segments all with outer patch of spatulate spinules, first 2 segments each with an inner seta, last segment with 1 outer spine and 3 terminal setae (outermost longest and spinose in distal half). Leg 4 (Fig. 11) similar to leg 3 except exopod last segment with only 4

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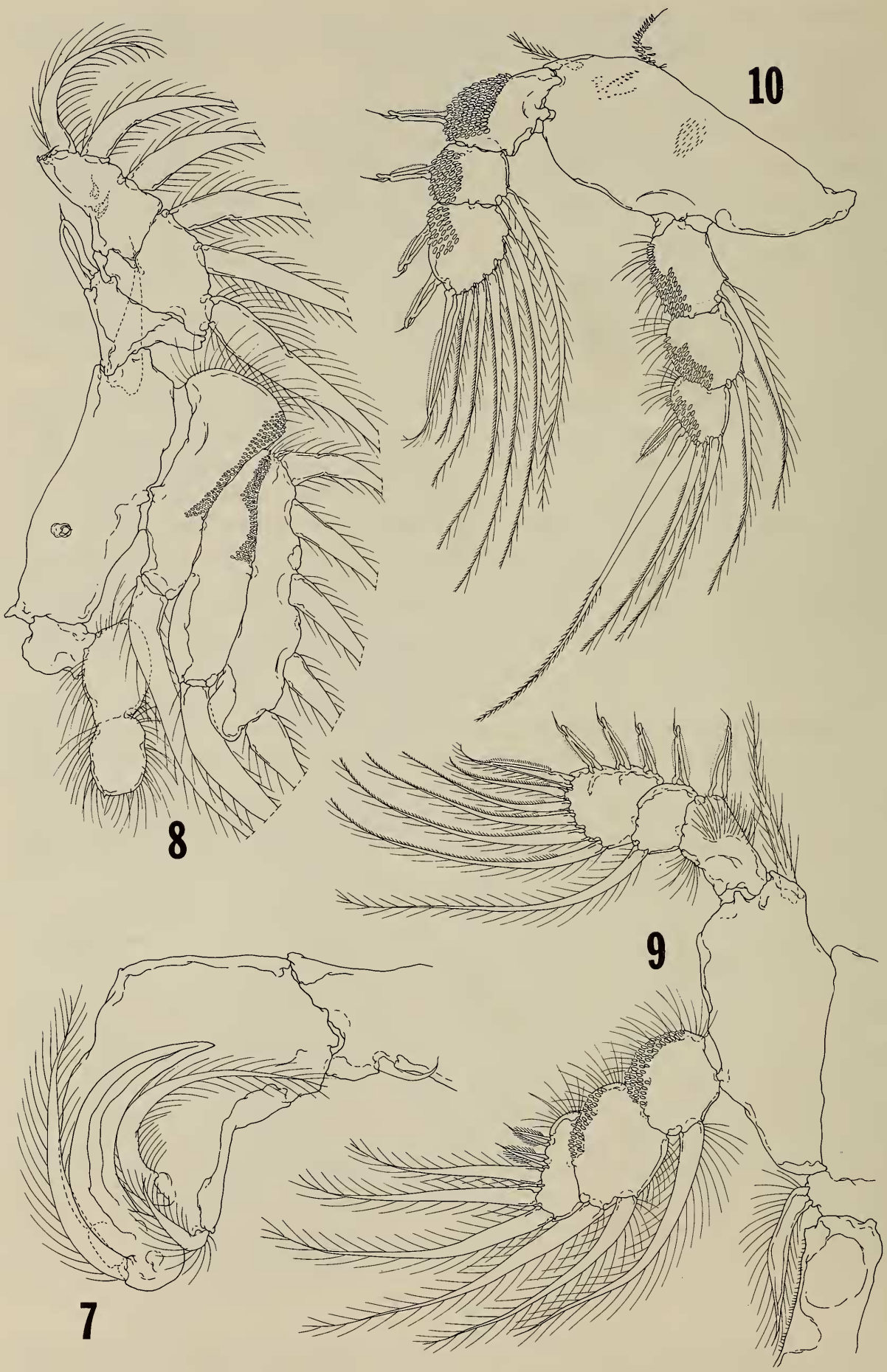
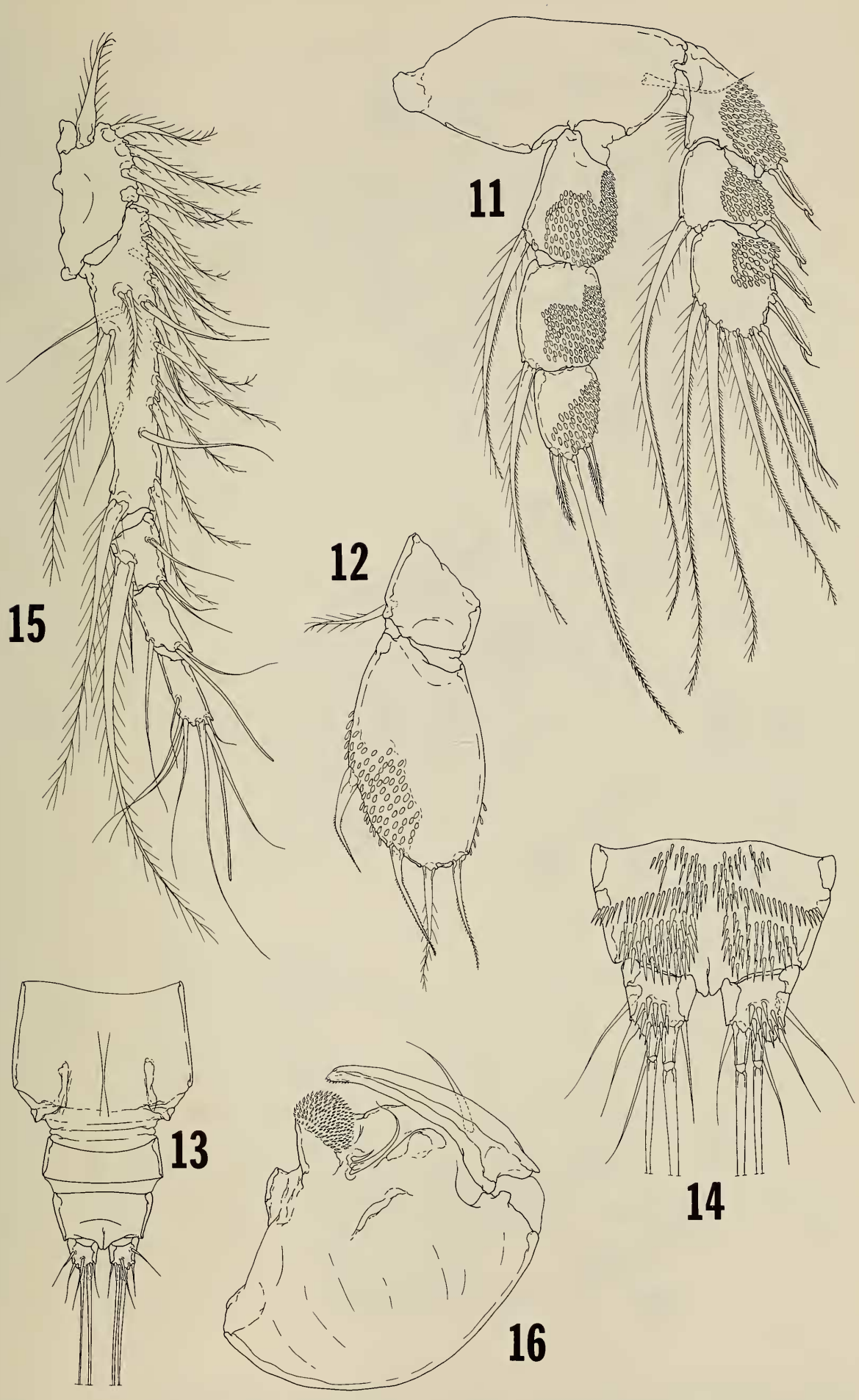
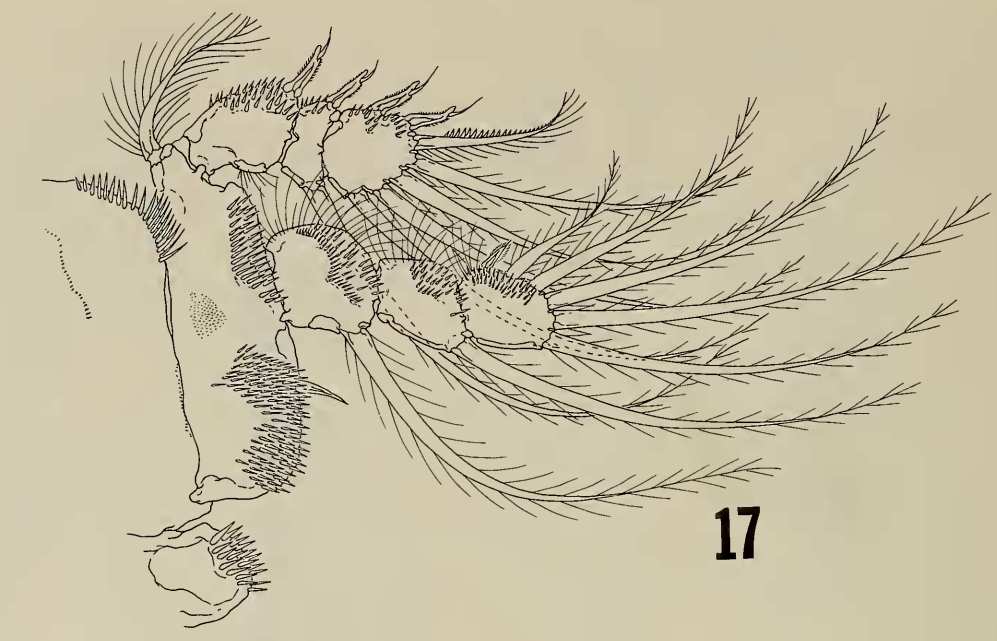
Figs. 1–6. *Holocolax longisetus* ♀: 1, Dorsal; 2, Genital segment and abdomen, dorsal; 3, Last abdominal segment and caudal rami, ventral; 4, First antenna; 5, Second antenna; 6, Mandible, paragnath, first and second maxillae.

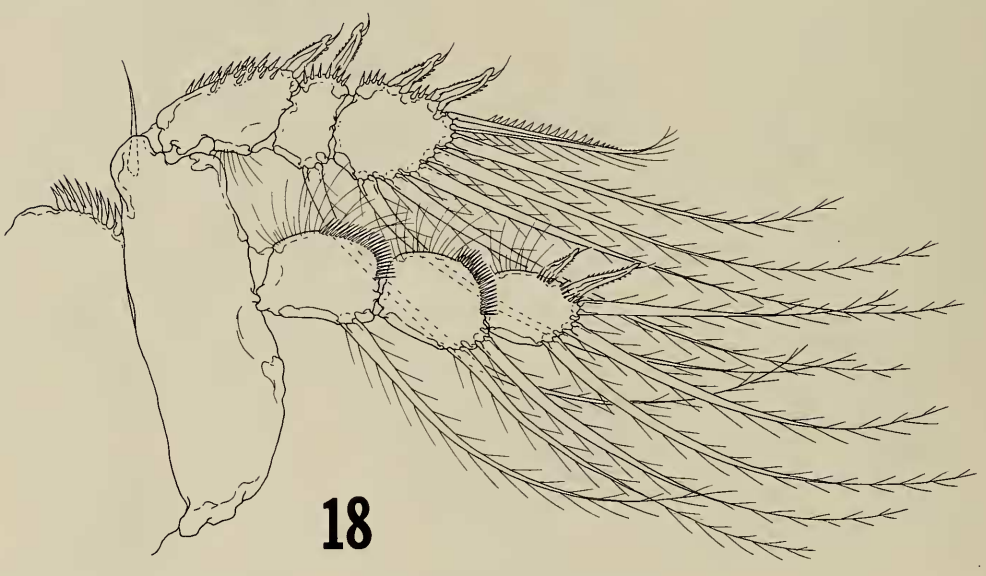


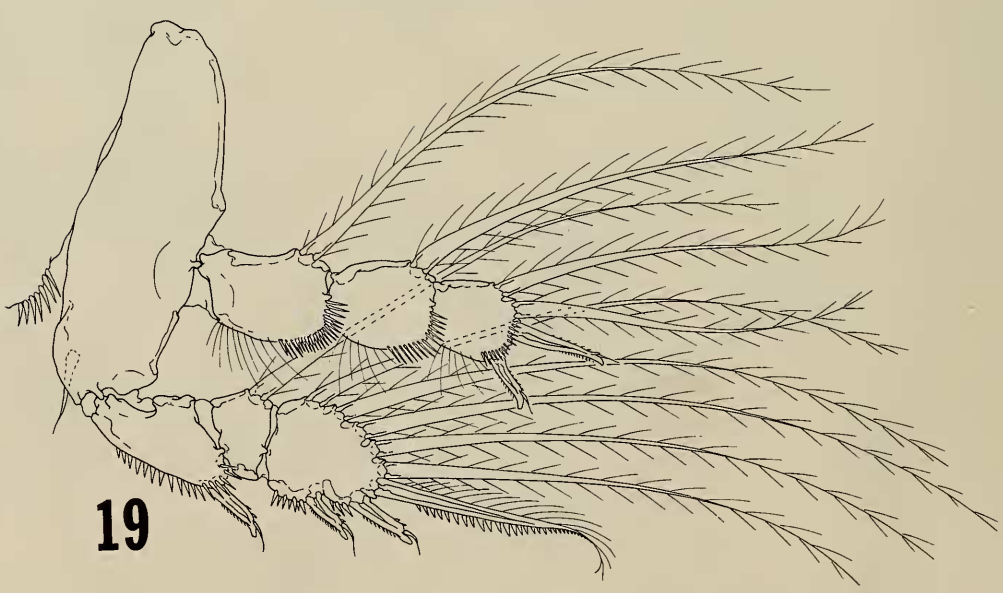
Figs. 7–10. *Holocolax longisetus* ♀: 7, Maxilliped; 8, Leg 1; 9, Leg 2; 10, Leg 3.



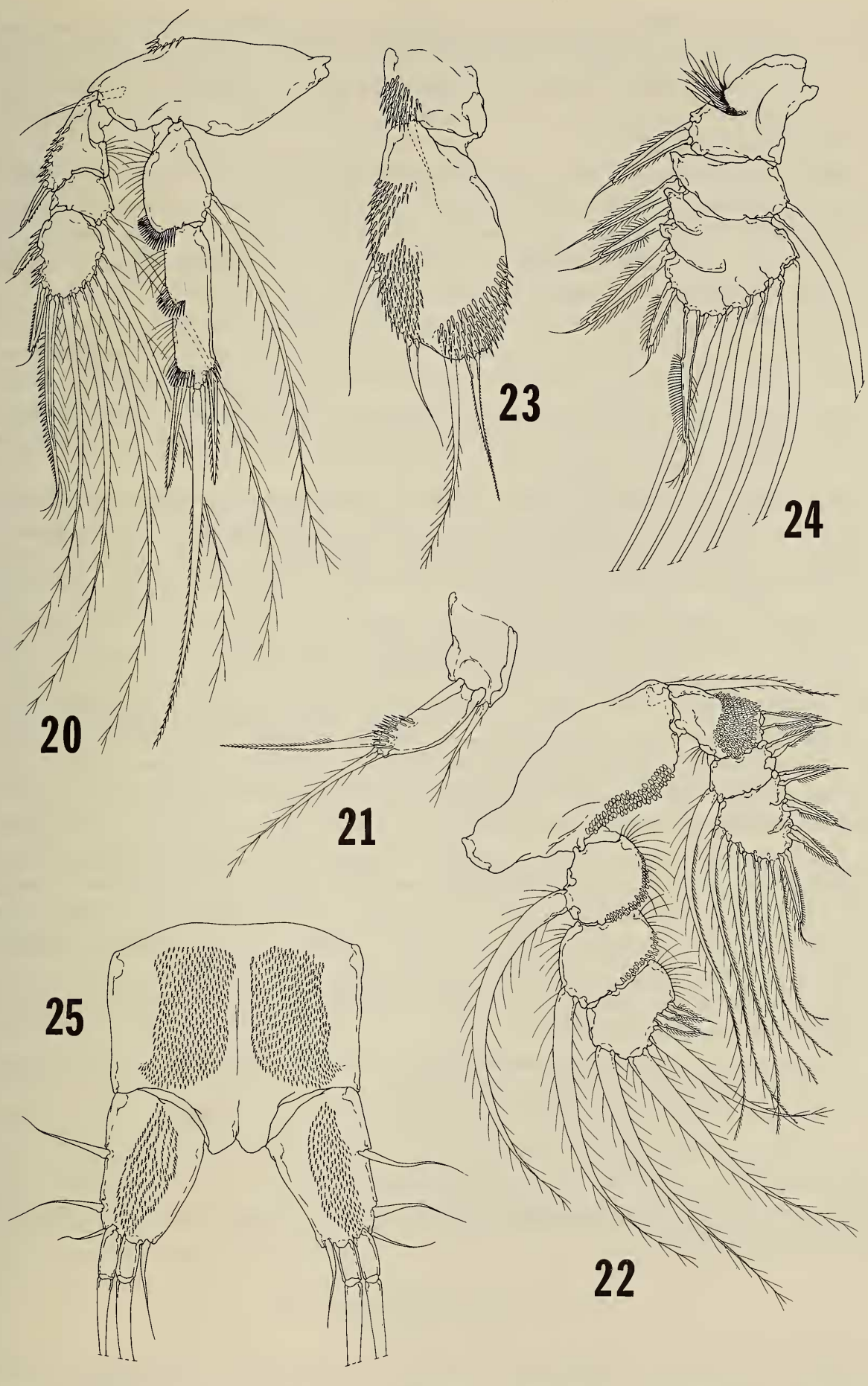
Figs. 11–16. *Holocolax longisetus* ♀: 11, Leg 4; 12, Leg 5; ♂: 13, Genital segment and abdomen, dorsal; 14, Last abdominal segment and caudal rami, ventral; 15, First antenna; 16, Maxilliped.







Figs. 17–19. *Holocolax longisetus* ♂: 17, Leg 1; 18, Leg 2; 19, Leg 3.



Figs. 20–25. *Holocolax longisetus* ♂: 20, Leg 4; 21, Leg 5. *Holocolax russelli* ♀: 22, Leg 2; 23, Leg 5. *Holocolax nemipteri* ♀: 24, Leg 2 exopod; 25, Last abdominal segment and caudal rami, ventral.

setae, endopod without hairs on outer edges of segments and last segment with 2 spines and one seta. Leg 5 (Fig. 12) free segment with patch of spatulate spinules on outer surface and 4 setae of about equal length, terminalmost sparsely plumose, others finely plumose. Leg 6 represented by 2 short setae at area of egg sac attachment (Fig. 2).

Male.—Total length 464 μm and greatest width 188 μm (measured at widest part of cephalon). Genital segment (Fig. 13) somewhat wider than long. Abdomen 2-segmented, last segment with ventral patches of long, pointed spinules (Fig. 13). Caudal ramus (Fig. 14) about as long as wide (11 μm) with a ventral patch of pointed spinules and 6 setae, terminal 2 nearly equal in width at base.

First antenna (Fig. 15) as in female except outer setae of first 2 segments not as robust and more sparsely plumose, inner plumose seta of third segment extending well beyond tip of antenna (corresponding seta in female very short). Other cephalic appendages as in female except maxilliped (Fig. 16) basal segment robust with a spinose knob on inner margin, claw relatively straight with inner edge of tip spinose opposing knob on basal segment.

Leg 1 (Fig. 17) not modified as in female, coxopod with row of pointed spinules along outer distal corner. Basipod with a prominent plumose seta on outer corner, an inner naked seta on distal margin inner to endopod, and 2 large patches of pointed spinules; exopod first segment with patch of spinules along outer edge and a spine on outer distal corner, second segment similar to first except with an inner seta, last segment bearing 2 outer spines and 5 setae, outermost seta with spinose outer edge, all spines with subterminal flagellum; endopod first and second segments each with a patch of spinules and an inner seta, last segment with 1 outer spine and 5 setae. Leg 2 (Fig. 18) similar to leg 1 except basipod without ornamentation, exopod last segment with 5 setae, endopod segments with a row (rather than patch) of spinules on outer distal border of each, second segment with 2 inner setae, last segment with 2 spines and 3 setae. Leg 3 (Fig. 19) similar to leg 2 except exopod second segment lacking outer spine, endopod second segment with one inner seta (2 in leg 2) and last segment with 2 setae (3 in leg 2). Leg 4 (Fig. 20) similar to leg 3 except exopod last segment with 4 setae (5 in leg 3), endopod 2 segmented and last segment with one terminal seta flanked by a spine on each side. Leg 5 (Fig. 21) with a patch of pointed spinules at inner distal corner and 2 terminal setae, inner seta with short close plumosities, outer sparsely plumose. Leg 6 absent.

Etymology.—*longisetus,* alluding to the unusually long seta on the last segment of the endopod of the female third leg.

Remarks.—This species differs from *Holocolax nemipteri* (Pillai) by its patches of scalelike spinules on the abdomen and caudal rami whereas *nemipteri* has pointed spinules. It differs from both *nemipteri* and *russelli* as its terminal setae of leg 5 are all about equal in length whereas in the other species the terminalmost seta is much longer.

Holocolax russelli, new species
Figs. 22–23

Material examined.—Holotype ♀ (USNM 190513) and 1 ♀ paratype (USNM 190514) from the gill area of 1 specimen of *Nemipterus metopias* (BPBM 22159)

from Damaguete City, Philippines. Additional material consisting of 2 ♀ from 1 specimen of the same host species (USNM 227079) from Palawan, Philippines and 1 ♀ from the same host (CSIRO AS5/80/57) from Australia.

Female.—Total length and greatest width 798 × 431 μm respectively. This new species closely resembles *H. longisetus* and *H. nemipteri,* and only those points of difference will be discussed. Genital segment 94 × 135 μm (l × w respectively). Abdominal segments measure 59 × 88 μm, 35 × 77 μm, and 41 × 65 μm (l × w), respectively. Caudal ramus somewhat longer than wide (29 × 21 μm).

Leg 2 (Fig. 22) exopod first segment with large patch of scalelike spinules on distal half (hairs in *H. longisetus* and *H. nemipteri*) otherwise similar to *H. longisetus*. Leg 5 (Fig. 23) mid-terminal seta much longer than others (all setae of equal length in *H. longisetus*).

Male.—Unknown.

Etymology.—This species is named for Dr. Barry Russell who identified and sorted collections of *Nemipterus* species for me to examine for parasitic copepods.

Remarks.—This new species can be easily separated from *H. nemipteri* and *H. longisetus* by the presence of a large patch of spatulate spinules on the first exopod segment of the second leg in *H. russelli* (hairs in *H. nemipteri* and *H. longisetus*).

Holocolax nemipteri (Pillai, 1973)
Figs. 24–25

Holobomolochus nemipteri Pillai, 1973:487.

Material examined.—2 ♀ from the gill area of 6 *Nemipterus japonicus* and 2 ♀ from 5 specimens of the same host species from the Andaman Sea, R. V. *Anton Bruun,* Cruise 1, Stations 28C and 49. Three ♀ from 2 specimens of the same host from Palk Bay, Sri Lanka.

Female.—This species was well described by Pillai 1973, and I will only supplement that description with those characters which differ from the previous 2 species.

Leg 2 exopod (Fig. 24) first segment with a row of hairs rather than the patch of hair present in *H. longisetus*; the middle outer spine on the last segment is longer than the ones to either side, in the other 2 species these spines are of equal lengths. The ventral surface of the last abdominal segment and caudal rami (Fig. 25) bear patches of small spinules unlike the prominent spatulate spinules on the abdomen and caudal rami of the other 2 species.

Acknowledgments

I thank Dr. Barry Russell for identifying and sorting host species for me and Hillary Boyle Cressey for reading and commenting on the manuscript.

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